Name:

at1124exam: Radicals and Squares (v908)

Question 1

Simplify the radical expressions.

$\sqrt{63}$ $\sqrt{18}$ $\sqrt{20}$

$\sqrt{3 \cdot 3 \cdot 7}$ $\sqrt{3 \cdot 3 \cdot 2}$ $\sqrt{2 \cdot 2 \cdot 5}$

$3\sqrt{7}$ $3\sqrt{2}$ $2\sqrt{5}$

Question 2

Find all solutions to the equation below:

$$2(x-10)^2 - 7 \;=\; 43$$

First, add 7 to both sides.

$$2(x-10)^2 = 50$$

Then, divide both sides by 2.

$$(x-10)^2 = 25$$

Undo the squaring. Remember the plus-minus symbol.

$$x - 10 = \pm 5$$

Add 10 to both sides.

$$x = 10 \pm 5$$

So the two solutions are $x = 15$ and $x = 5$.

Question 3

By completing the square, find both solutions to the given equation. *You must show work for full credit!*

$$x^2 + 8x = -7$$

$$x^2 + 8x + 16 = -7 + 16$$
$$x^2 + 8x + 16 = 9$$
$$(x+4)^2 = 9$$
$$x + 4 = \pm 3$$
$$x = -4 \pm 3$$
$$x = -1 \quad \text{or} \quad x = -7$$

Question 4

Any quadratic function, with vertex at (h, k), can be expressed in vertex form:

$$y = a(x-h)^2 + k$$

A quadratic function is shown below in standard form.

$$y = 3x^2 + 36x + 100$$

Express the function in **vertex form** and identify the **location** of the vertex.

From the first two terms, factor out 3 .

$$y = 3(x^2 + 12x) + 100$$

We want a perfect square. Halve 12 and square the result to get 36 . Add and subtract that value inside the parentheses.

$$y = 3(x^2 + 12x + 36 - 36) + 100$$

Factor the perfect-square trinomial.

$$y = 3((x+6)^2 - 36) + 100$$

Distribute the 3.

$$y = 3(x+6)^2 - 108 + 100$$

Combine the constants to get **vertex form**:

$$y = 3(x+6)^2 - 8$$

The vertex is at point $(-6, -8)$.